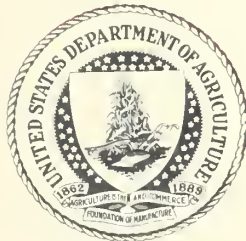


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BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE NEWS LETTER

VOLUME VI

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UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR DECEMBER 1938

Vol. VI, No. 2

(Not for publication)

February 1, 1939

BUREAU WORKERS AWARDED MEDAL

E. H. Siegler, of the Division of Fruit Insect Investigations, and Lyle D. Goodhue, of the Division of Insecticide Investigations, have been awarded the annual medal by the Eastern Branch of the American Association of Economic Entomologists, for their paper entitled, "The Effect of Particle Size of Some Insecticides on Their Toxicity to the Codling Moth Larvae," which was presented at the Baltimore Meeting. The annual award was first granted at the 1938 meeting and will continue to be made annually for the paper presented at the Annual Meeting of the Eastern Branch that shall represent the best contribution to the science of economic entomology.

FRUIT INSECT INVESTIGATIONS

Codling moth larvae make good fish bait.--One way to reduce the numbers of overwintering larvae of the codling moth is to use them for fish bait. E. J. Newcomer reports that Don Gladson, a former employee of the Yakima, Wash., laboratory, in looking for part-time employment during the winter, hit on the idea of collecting and preserving codling moth larvae and selling them to fishermen. He worked out his own methods of collecting, killing, and preserving the larvae to make them white. He puts three dozen in each vial and sells them wholesale to sporting-goods stores. There is much winter fishing for whitefish (Prosopium williamsoni Girard, and P. oregonium Jordan and Snyder) in the Yakima River and its tributaries. One of the common baits used has been the white larva of the goldenrod gall fly (Eurosta solidaginis Fitch). This winter these larvae seem to be scarce, therefore the demand for codling moth larvae has been good.

Flight habits of *Tribolium castaneum* (Hbst.).--This insect, known as the red flour beetle, occurs in stored raisins along with *Tribolium confusum* Duv., said to be a nonflying species. Neither can be said to be abundant in an average year. One record of evening and night flight of *T. castaneum* was obtained by Dwight F. Barnes and George H. Kaloestian, of the Fresno, Calif., laboratory, by means of collections removed from a rotary net every 15 minutes, from 5 p.m., September 7, to 7 a.m., September 8. The data are as follows:

:Beetles:		:Flies:	
Time	: taken :	Time	: taken
P.M.	: Number :	P.M.	: Number
4:15-----	1	2:45-----	2
6:15-----	7	3:30-----	1
6:45-----	51	10:45-----	1
7:00-----	3	a.m.	
7:15-----	0	12:30-----	1
7:30-----	3	2:15-----	1
7:45-----	6	3:30-----	1
8:00-----	1	7:30-----	1
8:15-----	1		

Sunset was at 6:15. The record indicates that the red flour beetle is on the wing chiefly early in the evening, when light meter readings have nearly reached zero.

During the period from April 14 to October 31, 1933, the net captured 3,461 red flour beetles, as follows: April, 0; May, 20; June, 5; July, 2; August, 377; September, 2,719; October, 352.

MEXICAN FRUITFLY CONTROL

No larval infestations found.—The first Mexican fruitfly trapped during the present harvesting season was taken on December 14. From that date until the end of the month seven more flies were taken on four other premises. While the number of flies trapped so far this season is somewhat below the seasonal average, it is evident that the annual migration of flies is taking place. Intensive grove inspections throughout the entire regulated area this season have failed to disclose any larval infestations. The combination of extremely dry weather and low prices for both oranges and grapefruit continues to plague the growers in the lower Rio Grande Valley. Many growers are delaying the harvesting of their crops, hoping for better returns and increased tonnage. As the early harvesting of fruit in this area is a distinct advantage in control work on the Mexican fruitfly project, the poor market conditions and dry weather now being experienced may be the factors which will determine the extent of infestation in this area later in the spring.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Outstanding resistance to Mexican fly again shown by Marquillo-winter wheat hybrid selections.—Elmer T. Jones, of Manhattan, Kans., reports that in fly-resistance tests, recently completed at Springfield, Mo., 63 winter-habit hybrid selections of F₇ generation involving crosses between winter wheats and fly-resistant Marquillo have again shown outstanding resistance. Thirty-four rows of varieties of known and unknown susceptibility distributed uniformly throughout the test series developed an average infestation of 73 percent, against 2.9 percent for the Marquillo hybrids. F₇ backcrosses and complex crosses involving some of these hybrids in the same tests were found to be comparable to their resistant parents in reaction to infestation.

Many of the F₇ hybrids are also being grown and tested by John H. Parker, experiment station agronomist. Some have been outstanding in yield tests. Carotene tests of four selections of Marquillo x Tenmarq gave a range of carotene of 2.5 to 3.0 parts per million. Four selections of Marquillo x Oro ranged from 1.8 to 2.1 parts per million. With Marquillo at 4.8, Tenmarq at 2.9, and Oro at 2.7 parts per million, it will be seen that some of these hybrids have a lower carotene content than their winter parents, an exceedingly desirable characteristic.

Rice weevil infestation of corn in the field.--R. T. Cotton, Manhattan, reports that an examination of corn in the field in November indicates that the rice weevil does fly to the fields in Kansas and Missouri and starts infestations in the maturing corn. Field infestations of corn by the rice weevil are not extensive in Kansas this year, but in southwestern Missouri 50 percent of the fields examined were infested.

JAPANESE BEETLE CONTROL

Nursery and greenhouse certification activities.--Inspectors from the Richmond office treated 101 Old English boxwoods and a ginkgo tree with carbon disulfide prior to certification. A large nursery in central New Jersey, at which an inspector is stationed all year, reported a total of 41,679 shipments made during 1938, an increase of 727 shipments over 1937. Approximately 50 percent of these were made under Japanese beetle certification. There was an increase of about 45 percent in the number of plants certified from New Jersey nurseries and greenhouses. Requests for paradichlorobenzene treatments of azaleas indicate heavy demand for these plants. There was an increase of nearly 350 percent in the number of azaleas treated with this material, as compared with those treated in December 1937. New Jersey sand establishments showed a gain of 19 carloads over last year. One of the certified sand companies is installing a new crusher for the purpose of manufacturing "fine flour sand." Tests of methyl bromide as a fumigant for potted plants are being continued in co-operation with the Division of Control Investigations. Several of the larger nurseries have cooperated by supplying quantities of plants for the trials. It will be necessary to conduct tests on each species and variety before recommendations may be made as to the feasibility of using this type of fumigation. On the Eastern Shores of Maryland and Virginia approximately 30,000 fruit, nut, and shade trees, 80,000 items of general nursery stock, and 125 strawberry plants were offered for inspection and certification by class III establishments. Notwithstanding heavy freezes, one nursery in this area required the full-time services of an inspector. This establishment shipped nearly 27,000 fruit, nut, and shade trees.

Bermuda requires Japanese beetle certification.--Requests received during the month from two New York State nurserymen for inspection of plant material and issuance of Japanese beetle certificates to cover material destined to Bermuda brought to light a new policy on the part of the Bermuda Department of Agriculture. Permits to individuals or firms in the Japanese beetle regulated area, authorizing the exportation of plant material to Bermuda now contain, in addition to the usual provisions, the clause "provided they are certified free from Japanese beetle by an authorized official

of the United States Department of Agriculture and accompanied by an 'A' certificate (Form 24-644-b)." This precaution is evidently motivated by the observations made by J. W. Waterston, plant pathologist of the Bermuda Department of Agriculture, on his visit to the heavily infested Japanese beetle regulated area in the summer of 1938. One of the consignments certified for shipment to Bermuda required the freeing from soil of a number of extensive imported plants being shipped from a Long Island estate to the owner's Bermuda winter home. The estate superintendent, after cabling the owner in Bermuda, decided to chance removing the soil to meet certification requirements, although some of the plants may not survive this treatment.

Three counties shift from Federal- to State-administered W. P. A. funds.—Effective at the close of December 8, the entire Federal security wage personnel in Bergen, Morris, and Passaic counties, N. J., with the exception of 3 men, was transferred from W. P. A. funds administered by the Federal district W. P. A. office in New York City to funds allotted through the State W. P. A. This transfer involved approximately 450 men. The field work in these 3 counties will be carried on as before under the direct supervision of the appointed personnel of this Division; however, all matters relating to time and payroll details will be handled exclusively by State W. P. A. officials.

Special aerial survey to determine cost of elm elimination.—On December 27 work was started on a special survey to determine the cost of elm elimination in mountainous sections within the Dutch elm disease work area. Four representative plots have been selected for survey, each including approximately 5 square miles. Systematic surveys will be conducted in each of these plots by a 3-man crew composed of 1 autogiro observer and 2 W. P. A. ground workers. The observer will plot on aerial photographic maps the exact location of all elms over 2 inches DBH, together with certain other information, such as estimated DBH, species, value, condition, and the type of terrain in which situated. The two ground workers will fell 100 elms in each plot. The felled trees will be trimmed so that the trunks rest on the ground. They will be left until later in the season when they will be examined to determine the extent of elm bark beetle infestation.

Timber survey continued.—At the beginning of the month two Bureau-owned autogiros were still engaged in the timber-damage survey being conducted by the New Hampshire Fire Hazard Reduction and Timber Salvage Commission. On December 11 the State discontinued use of the small autogiro because of the short flight range of the ship and the necessity for flying greater distances from the Concord Airport. The 450 horse power cabin plane was grounded for a few days while repairs were made to the rotor system. During the week ending December 31, the latter autogiro crew surveyed some 275 square miles of woodland area. Additional territory assigned for survey includes the Mt. Cube and Rodney quadrangles.

Eradication even with Connecticut confirmations.—For the first time since June 11, the State leader in Connecticut was able on December 17 to report no confirmed tree standing. This is an unusual condition for Connecticut, since in previous surveys only 1 eradication area has been employed and it has been necessary to supply them with dead and dying trees

removals to keep them busy between eradication of diseased trees. There were times last summer when 66 men devoted their entire time to eradication of elms infected with Dutch elm disease. Total confirmations in the State during 1938 numbered 535.

Police provide protection for elm-sanitation workers.--With the assistance of two Pennsylvania motor policemen, sanitation work on two properties in Upper Mt. Bethel Township, Northampton County, was completed in mid-December. Owners of the properties tried to make it difficult for the men to work. Accordingly several crews working under police protection were detailed to the properties and disposed of the entire job in 2 working days.

Check made on nursery stock received at New York World's Fair.--Following reports from several of the New England district inspectors indicating the possibility that wild collected stock, as well as uncertified nursery stock, might be moving from the gypsy moth infested area to the New York World's Fair, a check was made from December 19 to 23. Arrangements were made with the Fair officials to have all nursery stock admitted only at the Horace Harding Gate. It was found that most of the arriving stock came from nurseries within a radius of 100 miles from New York City. Records of all stock received during the period April 7 to December 19 failed to show any stock moved contrary to a plant quarantine.

Christmas tree inspection.--Inspection of Christmas trees and greenery was completed on December 24. There was a considerable decrease in the number of Christmas trees offered for inspection and certification as compared with 1937. Curtailment of cutting operations, due to warm weather early in the season, accounted for most of the decrease. There was an increase this season in the quantity of Christmas greenery inspected prior to manufacture into wreaths, roping, and decorative pieces. Among lots of mixed greens inspected were nine in which infestation was found. Twenty-two gypsy moth egg clusters were removed and destroyed. Five of these consignments were inspected at Portland, Maine, with single shipments each originating at Auburn, Brunswick, Falmouth, and Westbrook, Maine. After certification the shipments were dispatched to Calais, Maine; Minneapolis, Minn.; Capac and Grand Rapids, Mich.; Summit, N. J.; Brooklyn and New York City, N. Y.; Toledo, Ohio; and Memphis, Tenn.

Exhibit material infested.--Thirty-three gypsy moth egg clusters have been removed from materials thus far assembled by the State of Maine Inland Fish and Game Commission for exhibits to be erected at the New York World's Fair and at the Sportsmen's Shows in Boston and New York City.

Pulp shipments resumed.--Plans are now being made to ship from central New Hampshire to paper mills in northern New York 80 cords of pulpwood per day for a period of 90 days. Very little pulpwood has been inspected in this section thus far this season.

FOREST INSECT INVESTIGATIONS

Parasite-garder returns from France.--W. F. Sellers was transferred in December 1 from the Saint Cloud, France, laboratory of the Division of Forest Parasitic Insect Introduction to the New Haven, Conn., laboratory of the Division of Forest Insect Investigations. For the past 2 years Mr. Sellers has been in Europe engaged in parasite work, giving particular attention to parasites of forest insects.

Dutch elm disease recovered from adult elm bark beetles.--In the spring of 1934 the Morristown, N. J., laboratory cooperated with the Dutch elm disease eradication unit in placing elm trap trees in outlying areas where trees affected by the disease had previously been found and removed. Adults and galleries of the two elm bark beetles, Scolytus multistriatus Marsh. and Hylurgopinus rufipes Eich., were subsequently removed from these trees and cultured by the Bureau of Plant Industry to determine whether the fungus (Geratostomella ulmi) which causes the disease was present. One of the areas where the trap trees were put out lies partly in Cumberland, Md., and partly in Wilby Ford, W. Va., across the Potomac River from Cumberland. The fungus was recovered from two adults of H. rufipes taken from a trap tree in this area. Recently the Dutch elm disease eradication unit has been collecting adults of this species from the hibernation tunnels that they have formed in the bark of living elm trees in the area. These adults have been cultured by the Bureau of Plant Industry. To date Geratostomella ulmi has been recovered from one adult H. rufipes taken from a tree about a mile distant from the trap tree from which the two adults contaminated with the fungus were taken earlier in the year.

Elm bark beetles attracted by adults caged on logs.--Field observations on the habits of the smaller European elm bark beetle (S. multistriatus) have shown that some elm wood is heavily attacked by it, whereas other wood in the same location and apparently in the same condition is lightly attacked or not attacked at all. The reason for this selectivity is not known but the results of an experiment conducted by E. S. Whitten, of the Morristown, N. J., laboratory, help to explain the reason. These results show that the presence of beetles on a log attracts other beetles. Early in August 1934, 22 logs, 4 feet in length and from 3 to 6 inches in diameter were cut from 4 elm trees. They were separated into 11 pairs so that both logs of each pair were from the same tree. All logs were "seasoned" in a screened cage for 10 days and then exposed for a period of 5 weeks in a large wooded area where the S. multistriatus population ranged from light to heavy. While the logs were scattered over a large area, those of each pair were placed not over 6 feet apart. The day the logs were placed in the field 2 male and 2 female S. multistriatus adults were caged at each of 4 points on 1 of each pair of logs. At the end of 5 weeks the logs were debarked and the maternal galleries of S. multistriatus were counted. While this was being done it was noted that only 1 of the caged females had made a maternal gallery. Most of the others had not contacted the xylem, although they had fed upon the bark. The following table shows the number of maternal galleries found in the logs. It will be noted that a significantly greater number of galleries were found in the logs on which beetles were caged.

Description of logs	: Logs	: Average bark area	: Mean galleries per log ^{1/}	: Sum of squares
Without caged beetles----	11	4.44 ± 0.31	5.6	1,553
With caged beetles-----	11	4.46 ± .35	25.7	6,608

^{1/}Difference = 20.1 (significant).

Minimum forest-air temperatures.--For the third consecutive winter the Portland, Oreg., laboratory is obtaining minimum air-temperature records under actual forest conditions, according to J. M. Whiteside. These data are being taken in connection with investigations concerning the natural control of populations of the western pine beetle (Dendroctonus brevicornis Lec.) through low winter temperatures. A total of 49 stations have been established at accessible points over a rather large portion of the ponderosa pine region, where periodic readings are being taken by interested cooperators living within the forest proper. This area includes the Yakima Indian Reservation and Klickitat County in Washington, and the Mt. Hood National Forest, Warm Springs Indian Reservation, Deschutes, Ochoco, and portions of the Malheur and Fremont National Forests in Oregon. Of this total number of stations, 33 will be recording daily minimum temperatures, 9 weekly, 4 monthly, and 3 the minimum for the winter. These readings will be checked against those recorded at the standard Weather Bureau stations, usually situated out of the timber in more exposed locations, in order to determine the variation between forest air temperatures and those taken regularly at the permanent stations.

Sex ratio of the Black Hills beetle.--According to Donald De Leon, of the Fort Collins, Colo., laboratory, preliminary counts on the proportion of the sexes of the Black Hills beetle (Dendroctonus ponderosae Hopk.) emerging from two of its host pines in the Rocky Mountain region were as follows:

Locality	: Year of emergence	: Females		: Total
		: Ponderosa: pine	: Limber: pine	
		: Percent	: Percent	: Number
Evergreen, Colo-----	1937	57.0	--	510
Estes Park, Colo-----	1938	60.8	--	838
Elk Mountain, Wyo-----	1938	--	55	792

It is planned to make more extensive counts to determine whether this variation is caused by inadequate sampling or by seasonal or regional differences.

Notes on pandora moth in Colorado.--The preserved bodies of 50 female pandora moths collected around blue neon lights at Granby, Colo., on August 2, 1938, which presumably flew there from the infestation on the

Adirondack National Forest, were opened by N. D. Wygant, Fort Collins, and were found to contain an average of 19.7 eggs. Thirteen of the moths contained no eggs and the most found in any moth was 97. The average number of eggs in 27 newly emerged moths was 153.1. These figures indicate that 27.2 percent of the eggs were laid before the flight to the lights. In the field eggs started to hatch the middle of August and on August 27 about half of the eggs were hatched. On September 20 a few unhatched eggs could be found on the north exposures. About 3 percent of the larvae are overwintering in the first instar, about 93 percent in the second instar, and 4 percent in the third instar. Most of the larvae hibernate singly, but occasionally in groups up to 6, more or less wedged between the needle bundles and attached with a little webbing.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Transportation to working areas difficult during first half of month.--In New England gypsy moth crews experienced considerable difficulty in reaching their working areas during the first half of December, owing to the condition of the dirt roads in many areas.

Amount of timber felled by hurricane in barrier zone appears underestimated.--In the gypsy moth barrier zone area there is considerably more hurricane-downed timber than was previously supposed. Because many of the most seriously damaged areas are in extremely remote localities, or on the opposite slope of the ridges, they cannot be seen from the roads.

Portable pumps now used to extinguish brush fires.--Knapenack-type water pumps, designed especially for fighting forest fires, are in almost daily use by gypsy moth crews wherever brush or forest debris is being burned.

Three small gypsy moth infestations found during special scouting work in Maine.--Check-up work at the sites of gypsy moth infestations located in Washington County, Maine, during the fiscal year 1938 was completed on December 7. No infestation was discovered during the current fiscal year in the town of Princeton, where approximately 1,455 acres of woodland and open country were examined. Three infestations, totaling 10 egg clusters, were found and destroyed by creosoting during the scouting of about 2,140 acres in Calais. One of these infestations consisted of 8 egg clusters, and only 1 egg cluster was found at each of the other 2 sites. The 4 supervisory employees temporarily assigned to this special scouting have been returned to work in the barrier zone area.

Arrangements made to inspect wood moved from infested section of barrier zone.--A novelty company recently moved from New Jersey to Canton, Conn., where there is an abundance of white and gray birch needed in the manufacture of various novelties. While their new location is within the barrier zone and is not covered by the gypsy moth quarantine, arrangements have been made to inspect all the material shipped by them.

Spruce trees dug up for temporary use as Christmas trees.--Many large spruce trees growing within the area regulated on account of the gypsy moth on Long Island, N. Y., were dug up with a ball of earth and sold as large

Christmas trees. In a few instances these trees were rented to church and school organizations, and will be returned and replanted in the nurseries shortly after New Year's Day.

New mine timber operation will impede future gypsy moth work.---A mine timber operation has recently been started near the site of a sizable gypsy moth infestation located during the current fiscal year in the township of Kingston, Pa. This infestation is situated on the west side of the Susquehanna River opposite Wilkes-Barre. Although the cutting of mine props and lagging at this infested site will not interfere with the scouting and selective thinning work yet to be done there this season, it will undoubtedly seriously impede the progress of spraying work next June.

Used crank-case oil employed in burning brush and forest debris.---Discarded wiping rags soaked in used crank-case oil have proved to be an excellent kindling agent in burning piles of brush and forest debris, especially when the brush is wet or green. All oil drained from motors used in gypsy moth work in the Pennsylvania area is now saved and issued to crews engaged in disposing of brush, which accumulates during selective-thinning operations.

Hundreds of shots fired in one area by deer hunters.---Gypsy moth employees were withdrawn from the woods during the deer-hunting season, and reports from one area demonstrate the advisability of such a procedure. Each of 742 hunters reported the killing of a deer in the Hickory Run section of Kidder Township, Pa., during the week ending December 3, and many others were unsuccessful in their efforts. The total number of deer killed does not indicate the actual number of shots fired in this rather restricted area, but it shows clearly why it is unsafe for employees of this project to work in heavily forested areas where hunting is permitted during the open season on deer.

C. C. C. gypsy moth work still curtailed by emergency operations.---C. C. C. gypsy moth work is still curtailed materially by the use of gypsy moth crews on emergency work made necessary by the hurricane and flood of September 21. The extent of this curtailment is typified by the report for the week ending December 17, which shows 658 6-hour man-days used on gypsy moth work supervised by this Bureau, while 1,856 man-days were taken from gypsy moth work and used on emergency operations. A total of 20,208 man-days of gypsy moth work was used on emergency duties from September 21 to December 17, exclusive of additional time used by several foremen taken from gypsy moth camps to supervise emergency crews detailed from other work. Gypsy moth work was being done from only 2 camps in Massachusetts and 2 camps in Connecticut during the middle of December. The men were employed chiefly in selective thinning and burning work at the sites of heavy infestations, although a little scouting was done. Since the first of July more than 930,000 new gypsy moth egg clusters have been creosoted in Massachusetts, over 1,679,000 in Connecticut, and approximately 36,000 in Vermont. In addition to this, it is estimated that slightly more than 163,000 egg clusters have been destroyed by burning brush and forest debris in Connecticut.

PLANT DISEASE CONTROL

Many rust-susceptible barberries destroyed in nurseries outside protected area.--During 1938 more than 23,000 rust-susceptible barberry bushes were destroyed in nurseries outside the area protected by quarantine No. 38 (revised), preparatory to qualifying those nurseries for Federal permits to ship immune species into the States comprising the rust-control area.

Physiologic races of stem rust identified in 1933.--During the winter of 1937-38 specimens of rusted wheat collected at more than 40 different points in southern Mexico were found to contain only 3 different pathologic races or strains of the stem rust fungus. Of these, race 59 constituted 58 percent of the isolates, race 38, 37 percent, and race 24 was found in only 1 collection. Neither race 59 nor race 38 attacks Marquis wheat normally. This accounts for the fact that Marquis wheat is widely grown as a rust-resistant variety in certain areas in Mexico. In northern Mexico 9 races were found. These were 38, 49, 56, 17, 19, 36, 11, 32, and 59 (listed according to their prevalence). All of these races were subsequently found in the United States. One of the most striking results of the stem rust survey conducted in 1938 is the fact that race 56 was not found at all in southern Mexico, although it constituted about 15 percent of the isolates made from collections obtained in northern Mexico, and subsequently became by far the most prevalent in the United States. The history of race 56 is quite significant in view of its prevalence during recent epidemic years. Race 56 was identified for the first time in the United States in 1928. That year it constituted 1/2 of 1 percent of the isolates identified. Its increase in prevalence since that time is shown in the following table.

Year	: Percentage of radial : isolates in United States
1928-----:	0.5
1929-----:	0.7
1930-----:	0.2
1931-----:	1.3
1932-----:	2.1
1933-----:	3.7
1934-----:	33.1
1935-----:	46.0
1936-----:	47.0
1937-----:	56.0
1938-----:	69.0 (incomplete)

Rapid killing of pines at Pyeatt, Wash.--One of the early pine infection centers found in western Washington is at Pyeatt, on the Olympic Peninsula, only a few miles from the extreme northwestern corner of the United States. This center, located by scouts in the summer of 1927, consisted of infection in 74 northern and western white pines grown in 3 rows from seed planted in 1915. Because of the excellent opportunity to observe the effect of the rust on the 2 species, H. M. Putnam recorded the following infection data from 1927 to 1930.

Pinus monticola					Pinus strobus				
Year :	Examined :	Infected :	per in- fect ed tree :	Cankers	Examined :	Infected :	per in- fect ed tree :	Cankers	
Number	Number	Percent	Number		Number	Number	Percent	Number	
1927---	69	: 34	: 50	: 5	: 9	: 3	: 33	: 1	
1928---	76	: 41	: 54	: 4	: 6	: 3	: 50	: 2	
1929---	74	: 69	: 93	: 14	: 5	: 4	: 80	: 13	
1930---	74	: 70	: 95	: 27	: 5	: 5	: 100	: 39	

No further examination of the trees was made until the fall of 1938 when it was found that of the original 74 trees only 10 were alive. These are heavily infected. At least 3 will die within the next year or two and the remainder within the next 5 or 6 years. The trees first became infected about 1924 when the pines were 5 years old. At present 86 percent are dead and in all probability the kill will be 100 percent within 25 years from the time they were planted.

Salt spray injures white pines in Connecticut.--Salt spray lashed as far as 45 miles by the recent hurricane severely damaged white pines in eastern Connecticut. It has been suggested that the salt concentration on the leaves caused plasmolysis, or a drying out of the cells. White pines were affected as far away as Pomfret and in many places looked as if they had been fire-killed. Ground juniper was the next heavily damaged, other sensitive trees being red cedar and hemlock. The most resistant tree to salt was the Colorado blue spruce, which is a native of the Rocky Mountains. Some of this spruce on the Rhode Island shore was entirely unaffected.

White pine shelterbelts valued highly in Iowa.--A recent survey shows that 80 owners place a high value on their white pine shelterbelts in Iowa, the average appraised value being \$836 per shelterbelt, or, reduced to a per acre basis, \$1,300. These owners indicated that the use of the shelterbelts for protection purposes was of paramount importance. This includes protection of homes, gardens, orchards, and livestock. Other uses listed were the improved appearance of the farmstead and a very limited use for fuel and lumber.

W. P. A. laborers taught to write their names.--In connection with the W. P. A. blister rust control work in the Southern Appalachian States, it was noted that a number of the men in various States had to sign their names with a mark. In order to overcome this, R. G. Pierce and J. G. Luce evolved a method of teaching these men to write their names. This method, which is proving successful, consists of writing the man's name on the top line of a page in plain script. Each letter in the name is then written vertically down the left-hand side of the paper, one letter for each line. The man then practices copying each letter on these lines until he can write them plainly. Several lines are then provided for 20 to 40 signatures and the pupil uses them in practicing his own signature. The men practice writing their names on their own time after official work is completed. One of the crew foremen in Virginia reports that his men are getting along fine with their writing lessons and that they can now write better than some of the other men of the crew.

COTTON INSECT INVESTIGATIONS

Field populations of hibernation pink bollworms.--In an effort to determine the pink bollworm population left on the soil surface in fields following cutting and burning of cotton stalks, H. S. Cowitt and G. F. Robertson, of Pringle, Tex., examined samples of trash from 100 square yards in each of 20 fields in the Big Bend area. Only the surface material that could be removed by hand picking or raking, i. e., bolls of cotton or bolls, were collected and examined. The fields from which the samples were taken represented various conditions representative of the entire Big Bend area. Some of the fields had not been flooded by the overflow of the Rio Grande that occurred in July and September; some had been flooded but the cotton had not been killed and continued to fruit late into the season and produced a large amount of heavily infested cotton; and in some fields the plants had been only partially killed by floods while in others they had been entirely killed by floods. The stalks had been cut and burned on different dates ranging from August 15 to October 31. The results of the trash examinations were as follows:

Class of fields	Fields	Date of	Larvae
	Number	clean-up	per acre
Green but not flooded----	1	:Sept. 15-30	: 0
Do-----	3	:Oct. 1-15	: 516
Do-----	2	:Oct. 16-31	: 7,183
Flooded but not killed----	1	:Oct. 1-15	: 1,549
Do-----	4	:Oct. 16-31	: 6,050
Partially killed by floods:	1	:Oct. 1-15	: 387
Do-----	2	:Oct. 16-31	: 677
Killed by floods-----	1	:Aug. 15-31	: 0
Do-----	2	:Oct. 1-15	: 97
Do-----	3	:Oct. 16-31	: 516

It will be noted that in all cases the earlier the crop matured and the earlier the fields were cleaned the fewer pink bollworms were found. The value of cleaning the fields early is strikingly shown by the increase in the number of worms per acre in the different classes of fields cleaned at successive dates. These examinations also indicate that if the stalks are cut and burned early in October the population will be so reduced that the expense of further reducing the population by hand picking or raking will probably be justified only in exceptional instances. Examinations of surface trash and soil for determining the larval populations were also made this year in 15 identical fields where examinations had been made in previous years. The average number of larvae per square yard found in trash above ground were 21.3 larvae in 1936; 51.5 in 1937; and 0.21 in 1938. The number of larvae found in the soil from the same areas where surface samples were taken were 4.37 larvae per square yard of soil in 1936; 7.75 in 1937; and 1.9 in 1938. However, all of the fields had been cleaned prior to examining this year but had not been cleaned in 1936 and 1937, and the surface samples included with the trash on the soil and the material remaining on the plants. Frosts occurred earlier and temperatures were lower this year than in the previous 2 years and probably had some effect on the smaller

populations but the floods and the early maturity of the crop which permitted an early clean-up are believed to be the chief factors in the great reduction in the numbers of hibernating larvae remaining in the fields. The unusual amount of moisture left in the soil from the September floods is expected to further reduce the winter survival in the already light populations and to result in a marked decrease in the infestation next season.

Hemipterous insects and diseased cotton blooms.--The occurrence in unusual numbers of cotton blooms with spotted petals and deformed anthers in Arizona last season was studied by T. P. Cassidy and his associates of the Tucson laboratory. Although this condition has been observed previously it had not been noted in sufficient abundance to be of much importance. The affected squares have a brownish discolored area on the side of the bud usually just below the tip, which remains noticeable on the petals after the flowers have opened. Sometimes the deformation of one or more petals is so extensive that the flowers do not open properly. In the open blooms the symptoms are more obvious. A few or all of the anthers are discolored and brownish and the stamen filaments are usually so aborted that the stylus appears elongated and quite often with a brown lesion near the base. Generally the affected blooms do not set bolls and when bolls are produced from the diseased blooms the seeds appear unfertilized, grayish brown in color, and do not develop properly. John M. Breazeale and Dean Asquith examined 1,200 blooms of Upland cotton in the Yuma area on July 28 and 29 and found 46 percent of the blooms diseased, and 70 percent of the 400 Pima blooms examined early in August were diseased. They tagged 100 diseased Upland blooms and 25 Pima blooms and found a week later that 74 and 60 percent, respectively, had been shed. The high incidence of diseased blooms and shed occurred during extremely hot and humid weather in the latter part of July. As the weather became cooler the percentage of diseased blooms decreased and on August 21 only 10 percent of Upland and 35 percent of Pima blooms were affected. The diseased blooms appear to be caused by organisms introduced through the punctures of hemipterous insects. A number of organisms are probably involved in producing this type of bloom injury but they have not been determined. Pathologists of the Bureau of Plant Industry, to whose attention the diseased blooms were called, found that in every case examined one or more punctures made by hemipterous insects were present. Several species of insects are involved but the most important are thought to be Creontiades femoralis Van D., Lygus spp., and Corizus hyalinus (F.), but definite proof has not been established. In 2 plots that were dusted for insect control, Breazeale and Asquith found 34 percent diseased blooms and 68 percent in the 2 checks; in another test, 14 and 26 percent, respectively, were found in the dusted plot and in the check. In a cage containing 2 cotton plants and 3 C. femoralis and 1 Lygus hesperus at Bard, Calif., 14 hanging squares were found and 11 showed definite insect punctures. T. C. Barber found 25 squares, blooms, and small bolls shed on 2 plants in a cage with C. femoralis at Mesa, while the other cages contained only 2 to 3. The incidence of the diseased blooms and shedding squares also followed shortly after the maturity and cutting of alfalfa seed and the increase in insect populations in cotton fields. It was also noted that an unusual number of shed squares during this period remained hanging to the plants by shreds of bark attached to the limbs. Shed squares are often found hanging to the plants but not in the proportion found this summer. From the observations made it appears that the diseased blooms and the hanging squares are

associated with Panipterous insect injury, although their relationships have not been definitely established.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Pink bollworm in the Salt River Valley.--Last fall the pink bollworm was again discovered in the Salt River Valley of Arizona where it was eradicated during the years 1929-31. As a first step toward eradication of this pest from this area, it was decided to destroy by burning the cotton debris left in the field after picking, which is known to harbor the pest through the winter. This cotton debris is ordinarily left by the farmers in the fields or plowed under, as is most convenient. This makes it necessary, in an eradication campaign, to systematically set about its complete destruction. This work was started with a crew of 65 men. The standing stalks are cut, either by hand or with special sled cutters, after which they are piled and then the ground is gone over with fine-tooth rakes especially designed for this purpose. The raked-up material, consisting of useless pieces of cotton, leaves, and other materials, is placed on these piles of stalks and the whole is burned. To date 206 acres have been completed; however, these operations were hindered on account of rains, and in some cases it was necessary to wait until farmers had completed the harvesting of their crops. It is anticipated that within the next 6 weeks these operations will have been completed on from 5,000 to 7,000 acres immediately surrounding the infested spot, which is 6 miles east of Gilbert, Ariz.

Reports from the Big Bend of Texas.--Final ginning reports for this area for the season just closed showed 322 bales of cotton, as compared to 3,218 bales last season. This "almost" crop failure was due in a great part to the pink bollworm. Last season the corn ear worms destroyed a large part of the first bolls. Ordinarily, after these insects disappear, the cotton would have made a fair crop, but in that section the pink bollworm is so severe that it destroyed practically all the late bolls; hence, these two pests, working together, and some flood damage brought about very serious conditions. As a part of a 2-year plan to control the pink bollworm in this area, which is the most heavily infested on the North American continent, the cotton debris left in the fields has been destroyed as was described for the Salt River Valley of Arizona. These operations were carried out also on the farms surrounding Ojinaga, Mexico, immediately across the boundary from the infested area of the United States. Therefore, the 2-year plan started last fall has been well carried out in all this area in the United States and in Mexico, and it is anticipated that the second part of this plan, retarded planting in the coming spring, will be accomplished in an equally thoroughgoing manner.

The Texas Panhandle District.--In this Plains area it was estimated at the close of December that about 9/10 percent of the crop of cotton had been ginned. Ginning operations were slowed up somewhat on account of static electricity, the result of dry weather and high winds, and which has a tendency to cause fires in lint cotton. Also, the winds put much loss in the seed cotton, which is very hard on the ginning machinery. Besides these troubles, the lint and the seed were reduced in value. As many pickers go into the great cotton crops for the fall and return after the picking season,

it is necessary to maintain road patrols to intercept parcels of cotton that might be carried out. In the examination of 5,424 pickers a total of 2,702 pounds of seed cotton and 55 pounds of cottonseed was intercepted and burned. Improved cooperation on the part of the pickers is being noted, many of them being found to have previously had their belongings well cleaned.

Survey work with autogiro.--In the lower Rio Grande Valley of Texas an effort is being made to eradicate the pink bollworm. A part of the program calls for killing the growing cotton plants early in the fall after picking operations have been completed, so as to prevent the pink bollworm from going into hibernation. In that subtropical country a field once planted to cotton continues to grow sprout cotton year after year, if the same is not destroyed. These areas of sprout cotton, many of them turned out from cultivation, have now grown up into weeds and timber, offering a hazard to the successful termination of the eradication program. Hence, it was desired to locate all these isolated places in some manner and to eliminate this hazard. To effect this purpose an autogiro was borrowed from the Dutch elm project, and is now very successfully making these surveys. By means of this machine, carrying a pilot and a local observer, many areas containing cotton have been located, which otherwise had not been found and probably never would have been. It is easy to locate these plants from the air and it is now believed that within the next 2 or 3 weeks we will know definitely where every patch of abandoned cotton is.

Wild-cotton eradication.--Carrying forward the program of exterminating the wild cotton indigenous to southern Florida, to prevent the pink bollworms that are in it making their way to the main Cotton Belt, difficulties were encountered and overcome and satisfactory progress was made in December. Mosquitoes were extremely numerous at times, but this condition improved toward the end of the month. Work at Cape Sable was inaugurated early in the month, and 11 other crews were in operation in other areas. During the latter part of the month the Ten Thousand Islands section was completed for the first time this season. A total of 199,458 wild cotton plants was removed in the Cape Sable area, of which only 1,033 had mature bolls. While there is an increase in the number of seedlings this season over last, there is a decided decrease in the number of plants with matured bolls. A very encouraging decrease in the number of wild-cotton bolls is noted in counties along the west coast. A small colony of virgin cotton was found recently by the Bonita Springs crew.

Thurberia-plant eradication in Arizona.--Approximately 1,440 acres were covered in the Santa Catalina Mountain Range during December, and 18,070 Thurberia plants of all sizes were located and destroyed by burning. Work was completed in Finger Rock Canyon and the camp was moved to Pima Canyon the early part of the month. Considerable repair of trails had to be made before the pack train could pass over them. The canyon contained no water fit for human consumption, and it was necessary to haul from 300 to 400 gallons of water daily. The camp will be moved to Ventana Canyon early in January and the preliminary preparations, including the building of 5 miles of trail through rough territory, have been made. Accidents during the month were negligible and the health of the workers has continued good, despite inclement weather and very cold nights.

Laboratory inspection.--Two pink bollworm larvae were found from material collected early in December from fields located 5 and 7 miles northwest of Alliance, Coahuila, Mexico. All available material from the Quezaco Valley and other plantings nearest to this infestation on the American side was inspected in the San Antonio laboratory as soon as possible, but none was found to be infested with the pink bollworm. During the month 12, 1935 bolls of sea-island cotton from north Florida were inspected, with negative results as to pink bollworm but infestation of boll weevil was quite heavy.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Low wind velocities at night favor dusting for pea aphid control.--J. E. Dudley, Jr., and T. E. Bronson, of the Madison, Wis., laboratory, report that an analysis of the wind velocities at the experimental plots at Waunakee, Wis., during the 24-hour period of each day during June for the 3 years, 1936-38, inclusive, has shown that on an average during this monthly period, when dusting operations against Macrosiphum (Illinois) pici Kalt. are usually performed in Wisconsin, there was a total of 63 hours of daylight when the wind velocities ranged from 0 to 4 miles per hour, as compared to a total of 223 nocturnal hours when the wind was in the same velocity range. It is within this velocity range that dusting operations against the pea aphid can be most effectively performed under Wisconsin conditions. The analysis demonstrated further that the wind velocities remained within a range of from 0 to 4 miles per hour for consecutive periods of 3 hours or more at a time approximately two and one-half times as often during the night as during the daylight hours. These data indicate the desirability of applying dust mixtures for pea aphid control during the night whenever conditions will permit.

Adding conditioners to rotenone-containing dusts slightly increased efficiency against pea weevil.--T. A. Brindley and J. Linduska, of the Moscow, Idaho, laboratory, report that experiments with dust mixtures containing rotenone against Bruchus pisorum (L.) on garden plots in 1938 showed that the addition of various conditioners to the dust mixtures gave only slightly increased efficiency, as compared to dust mixtures composed solely of finely ground karris or cube root with talc or diatomaceous earth as a diluent. The results of these experiments may be summarized as follows: (1) Dust mixtures containing 1 percent of rotenone with talc as the diluent, which is now being used commonly by the growers, gave a control of 95.5 percent when applied to plots which were harvested as green peas and 91.6 percent in plots which were harvested as dry peas, as compared to considerable untreated plots. (2) A dust mixture containing 1 percent of rotenone with diatomaceous earth as a diluent, also being used commonly by the growers, gave a control of 98.9 percent in the green pea plots and 95.2 percent in dry peas. (3) A dust mixture containing 1 percent of rotenone with talc as a diluent plus 1 percent of lampblack, by weight, gave a control of 100 percent in the green pea plots and 99.4 percent in dry peas. (4) A dust mixture containing 1 percent of rotenone plus 2 percent of kerosene oil, 1 percent of sodium silico-phosphate as a wetting agent and 0.5 percent of water gave a control of 100 percent on green peas and 96.1 percent on dry peas. (5) A mixture containing equal parts, by weight, of a dust mixture containing 1 percent of rotenone with talc as the diluent and a dust mixture containing 0.5 percent of total pyrethrin with diatomaceous earth as the diluent gave a control of 99.6 percent on green peas and 98.9 percent on dry peas.

Results of dusting against pea weevil in Pacific Northwest.--F. G. Hinman, R. A. Fisher, and T. A. Brindley report that a survey of the Blue Mountain area of Washington and Oregon at the end of the 1938 season revealed that over four times as much dust mixture containing rotenone was used against the pea weevil in this area as was used in 1937. In 1937 approximately 47.5 tons of dust mixtures containing rotenone, costing approximately \$10,925, were used to protect approximately 38,000 acres of peas. In 1938, with an acreage of approximately 34,000 acres, a total of 211.5 tons of dust mixtures containing rotenone, costing approximately \$37,780, were used. The general results of the control campaigns for the 2 years were nearly the same, since in 1937 there were 716 acres of peas, constituting 1.9 percent of the total acreage, discarded on account of the pea weevil damage, whereas in 1938 a total of 386 acres, or 1.1 percent of the total acreage, were discarded on account of pea weevil damage.

Sulfur and sulfur-pyrethrum dusts most effective against potato leafhopper on beans.--N. F. Howard, of the Columbus, Ohio, laboratory, reports that in comparing the efficiency of several dust mixtures and sprays against Empoasca fabae (Harr.) on beans during the course of experiments in Ohio in 1938, it was shown conclusively that dusts of undiluted sulfur or a dust mixture made up at the rate of 90 pounds of sulfur and 10 pounds of pyrethrum containing 0.9 percent of total pyrethrins gave best results in controlling this pest. Sprays containing basic copper arsenate, basic copper sulfate, sulfur nitride, and derris (0.015 percent of rotenone) were each ineffective. The addition of peanut butter to derris-dust mixtures increased their effectiveness, but these mixtures were not as efficient as undiluted sulfur or the sulfur-pyrethrum dust mixture. In general, the sulfur dusts were superior to sprays containing different materials.

Control of Mexican mealybug on chrysanthemums.--G. V. Johnson and C. A. Weigel, of the Beltsville, Md., laboratory, report that a very heavy infestation of Phenacoccus gossypii Towns. and Ckll. on chrysanthemums has been controlled by the use of two commercially prepared thiocyanate sprays used with and without a light mineral oil emulsion. These sprays were particularly effective against the mealybug nymphs. The sprayed plants made excellent growth, whereas the untreated check plants were practically ruined by the mealybugs.

Standard lead arsenate spray superior to derris, phenothiazine, or sulfur nitride against Colorado potato beetle.--R. H. Nelson and N. F. Howard, of the Columbus, Ohio, laboratory, report that in experiments performed during the summer of 1938 it was shown that standard sprays containing lead arsenate at the rate of 2 pounds to 50 gallons of water were far superior to derris sprays containing 0.015 percent of rotenone, phenothiazine (2 to 50), and sulfur nitride (22.9 percent pure) at the rate of 2 pounds to 50 gallons of water for the control of Leptinotarsa decemlineata (Say). Two applications of each of these sprays were made. Although slower in action, sulfur nitride compared favorably with phenothiazine and with derris at the expiration of 3 weeks after the second application; however, only lead arsenate gave satisfactory control at the expiration of the 3-week period. The addition of a varnish sticker to the derris spray did not improve the percentage of control.

Insect damage to shade- and sun-grown tobacco in Florida.--F. S. Chamberlin and L. L. May, of the Quincy, Fla., laboratory, report that a survey of insect damage in 15 fields of shade-grown cigar-wrapper tobacco in the Quincy, Fla., District in 1938, revealed that the damage to tobacco in the fields under observation was caused principally by the tomato worm (*Protoparce sexta* (Johan.)), the tobacco budworm (*Heliothis virescens* (F.)) and the tobacco flea beetle (*Egtrix parvula* (F.)). In making this survey the injury caused to the leaves was rated according to the prevailing breakage rates which are based on the degree of soundness of the leaf. The results of the survey indicated that the average loss in the shade-grown cigar-wrapper fields due to hornworms, budworms, and flea beetle, was 0.1, 0.5, and 1.5 percent, respectively. In addition, 15 fields of sun-grown tobacco, which is used by the tobacco trade for several purposes, were examined to determine the degree of injury caused by hornworms and budworms. The leaf injury to this type was rated according to an arbitrary system based upon an apparent loss of weight, and was 1.4 and 4.4 percent, respectively, for hornworms and budworms. Sun-grown tobacco, which is produced for use as cigar binders, frequently sustains an additional loss by insects due to reduction in quality, but no method of estimating this phase of loss is yet available.

INSECTS AFFECTING MAN AND ANIMALS

Removing horse-butt eggs from horsehair.--Commercial concerns interested in the use of horsehair in their manufactured products often report difficulty in removing nits of horse butts from the hair. S. W. Simons, of the Ames, Iowa, laboratory, has found that, of several materials tested for dissolving the substance which cements the egg to the hair, trypsin ($\frac{1}{2}$ solution, pH 7.2-7.6) will dislodge all the eggs in 24 hours without apparent injury to the hair. Other materials tested did not effect complete separation of the nits without damage to the hair.

Increase in resistance to screwworm infestation.--E. W. Locke, of the Dallas, Tex., laboratory, reports that guinea pigs that have previously been exposed to two and three sublethal infestations of *Cochliomyia americana* C. and F. exhibit about twice the resistance to minimum lethal infestations as do animals which have never been infested.

Effect of viscosity on toxicity of fly sprays.--Preliminary experiments carried out by Craig Eagleson, Dallas, to determine the effect of viscosity of a fly spray on its toxicity toward *Musca domestica* L., gave no indication that the toxicity of a livestock spray is affected by the viscosity of the carrier.

Survey of Chaoborus larval population in Clear Lake, Calif.--A. W. Lindquist, of the Nice, Calif., laboratory, reports on a study of the population density of *Chaoborus* larvae during October, November, and December 1938, as follows: "A survey of the bottom of Clear Lake by means of an Ekman dredge shows the larvae fairly equally distributed but more numerous in the shallower waters within 2,000 feet of shore. The average number of larvae per sample at 6 stations in the big part of the lake, in 9 to 20 feet of water, was 149; at 5 stations in 21 to 25 feet of water, 353; and at 4 stations in 26 to 29 feet of water, 305. The average number of larvae in the lower part

of the lake at 5 stations in 30 to 42 feet of water was only 210. On the basis of the average sample, a larval population of from 230 to 1,400 per square foot, or from 12 to 61 million per acre, is indicated. Chaoborus larvae have continued their nightly migrations from the bottom mud to the upper strata of water as soon as the sun sets."

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Twenty-five living larvae of the Mexican fruitfly (Anastrepha ludens Loew.) were intercepted at Laredo, Tex., on September 8, 1938, in 3 pears in baggage from Mexico. Six larvae and 28 pupae, all living, of the olive fruitfly (Dacus oleae Gmel.) were intercepted at New York, on September 22, 1938, in olive fruits in baggage from Italy. Four living larvae of the pyralidid Hypsipyla grandella (Zell.) were taken at New Orleans on September 10, 1938, under the bark of a cedar log in cargo from Honduras. Living specimens of the coccid Puto mexicanus (Ckll.) arrived at San Francisco on June 20, 1938, on orchids (Laelia anceps) in express from Mexico. Living specimens of Haplothrips melaleucus (Bagnall) were intercepted at Honolulu, Hawaii, on April 12, 1938, on a leaf sheath of an orchid (Renanthera monachica) in the mail from the Philippines. A living larva of the olethreutid Laspeyresia splendana (Hbn.) was found at Philadelphia on October 17, 1938, among acorns in the mail from England. Living specimens of Anuraphis cynariella Theob. were taken at Boston on December 12, 1937, on globe artichoke in ship's stores from England. An adult of the weevil Tychius quinguepunctatus L. arrived at Seattle, Wash., on May 9, 1938, in vetch seed in cargo from France. A living specimen of the lygaeid Stygnocoris pedestris (Fall.) was found at Chicago, Ill., on September 27, 1938, on heather in the mail from Scotland. A living specimen of the coccid Lecaniodiaspis dendrobii (Dougl.) was taken at Washington, D. C., on August 2, 1938, on a pseudobulb of an orchid in express from Venezuela. A living larva of the olethreutid Laspeyresia nem-brosa Heinrich was intercepted at Brownsville, Tex., on October 14, 1938, in a mesquite bean in baggage from Mexico.

Pathological interceptions of interest.--Albugo candida (Pers.) Kuntze was found on pods of Lunaria sp. in a shipment from Holland on October 20 at Philadelphia. Arhelenchoides tenuicaudatus de Man was intercepted in yams in baggage from Jamaica on September 15 at New York. Ascochyta sp. was intercepted on endive for the first time on December 21 at New York in a shipment from Belgium. Cephalobus persegis Bastian was intercepted on September 28 at New York in Chionodoxa bulbs from Holland. Cercospora musae A. Zimm. was intercepted on banana leaves from Guatemala on December 1 at Boston and from Venezuela on December 6 at New York. Coniothyrium (oryzae Caf.)?, the spores being narrower than the description calls for, was intercepted in rice hulls from Puerto Rico on October 10 at New York. Coniothyrium sp. was found on Jacaranda seed from Mexico on September 12 at El Paso. Cylindrosporium castanicolum (Desn.) Berl. was intercepted on chestnut leaves in onion baskets from Italy on August 17 at New York. Diplodia coccarpa Sacc. var. malaccensis Tassi was intercepted on a coconut husk in mail from Tahiti on August 10 at Boston. Gloeosporium epidendri P. Henn. was found on Epidendrum radiatum entering under special permit from Guatemala at San Francisco on August 9. G. oncidii Oud. was found on plants of Oncidium superbiens from Colombia on October 21 at San Francisco. G. phormii (P. Henn.) Sacc. was intercepted at New York on October 5 on a

special permit plant of Phormium colensoi from New Zealand. Helminthosporium curvulae Sacc. was found on one pepper in three crates from Cuba on December 19 at New York. Heterodera varioni (Gernu) Goodey was intercepted in Villandia sp. from Mexico on November 29 at San Francisco. Marasmius sp., no species reported on host, was intercepted at Rite on February 14, 1933, on Synhora secundiflora from Mexico. Orbilia myristicae P. Henn. was intercepted on a fruit of Myristica sp. in mail from Ceylon on September 13 at New York. Phaeocryptopus nudus (Pk.) Petr. was found on Abies balsamea in baggage from Nova Scotia on July 16 at Boston. Phaeomptoria bryzae Miyaki was found on rice hulls from Puerto Rico on October 10 at New York. Platyspora sphedrae Speg., Sphaerella sphedrae Hollos, and Endersonella sp. were found on Sphedra sinica in mail from Japan on September 23 at New York. Physalospora orchidearum P. Henn. was found on Oncidium superbiana from Colombia on October 21 at San Francisco. Phyllosticta maculiformis Sacc. was intercepted on chestnut leaves in mail from Germany on December 7 at New York. Puccinia encyclata Schw. was intercepted on Panicum capillare used as packing around a willow tree from Canada on October 27 at Buffalo. Vermicularia phlogina Fairm. was intercepted at Buffalo on November 5 on Phlox subulata in a shipment entering via truck from Canada.

Trans-Pacific air express.--Shipments arriving at San Francisco show a steady upward trend, reaching a peak on October 19, when the Philippine Clipper arrived from Manila via Honolulu carrying 212 express packages, including 40 packages of plant material, of which 20 were consigned to points in California, the other 20 to points in other States. Owing to the high express rates for such material and the careful scrutiny given these shipments by the Territorial Plant Inspectors in Hawaii, very few infested shipments are being encountered.

Timber pests intercepted in materials for San Francisco World's Fair.--Building material for the Japanese exhibit at the Golden Gate international exposition, consisting of several thousand bundles of specially milled lumber and logs--the latter with bark adhering--were found on inspection to be generally infested with a number of living forest insects, some of which are not known to occur in this country. The following beetles or their larvae were found in infested logs working in the cambium layers just beneath the bark: Ips japonicus Mij. (adults), Orthotomicus sp. (adults), Cryptorhynchus sp. (larvae, pupae, and adults), Agathidium sp. (larvae), Colloidium rufipennis Motsch. (adult), and Dicerca sp. (larvae). Two queens of an undetermined termite were also found just under the bark. Specimens of a large weevil (Sitona hyacritae Boh.) were found deep in the heartwood of fir logs and milled lumber and the larvae indicated an ability to destroy the merchantability of lumber from infested logs. Fumigation under rubberized gas-tight tents, using 4 ounces sodium cyanide (Na CN) per hundred cubic feet of space for 12 hours and later for 17 hours, proved inadequate as control measures, apparently owing to absorption of the gas by the excessive amount of moisture present. Subsequent treatment using methyl-bromide at the rate of 3 pounds per thousand cubic feet of space for a period of 48 hours under the same type of covering, a rubberized gas-tight tent, proved entirely adequate against all stages of the various insects intercepted insofar as it was possible to detect by inspection. Satisfactory disinfection was necessary as a condition of release, as all of the insects intercepted were in the adult stage, ready to emerge from the host, or in the pupal or advanced larval stages with every possibility

of completing their cycle during the period the host material would be in use at Treasure Island, and as the ultimate destination was immediately adjacent to Yerba Buena Island, on which there is an abundance of host pine. Tomeyuki Omari, Secretary for the Japan Association for New York and San Francisco international expositions, was most cooperative in offering to comply with every safeguard recommended before any attempt was made to move the material.

DOMESTIC PLANT QUARANTINES

More about the grasshopper survey.--The 1938 fall survey of grasshopper eggs consisted of (1) a special survey by R. A. Roberts, in September and October, of the northern Great Plains area infested by Melanoplus mexicanus Sauss., and (2) part of the regular crop survey by district surveyors. Mr. Robert's method was to examine at least 10 1-square-foot samples of surface soil or sod and determine the average number of egg pods per square foot. Rangeland was divided into (1) adjacent-to-crops (within 1 mile) and (2) open range. There were 1,394 soil samples collected from 144 fields and range areas of the Great Plains and 1,558 fields and range areas were sampled by the regular supervisors.

Grasshopper bait needs for 1939.--The quantity of grasshopper bait estimated as needed in 1939 for control operations in 24 Western States, in the event that Federal funds are available for such baiting, is approximately 206,000 tons, as compared with 178,411 tons estimated for 1938. A general reduction in grasshopper population was effected in 1938, as stated in the January 1, 1939, News Letter. The increased need for 1939 is occasioned by the migrations last season of M. mexicanus in the northern Great Plains area, and of Dissosteira longipennis Thos. in the Panhandle area of Texas and New Mexico and in southeastern Colorado. Much more acreage of so-called idle land is also included in this year's calculations, the result of better surveys of this type of land as a source of infestation. This has been considered as a separate and additional item for bait estimates for North Dakota, South Dakota, Montana, and Wyoming.

Interior Department to control crickets on public range.--According to an item quoted from the New York Herald Tribune of December 9, in the Department's Daily Digest, the Interior Department has announced that it will supply the man power and equipment for a concerted drive next spring to rid the public range of the West of millions of forage-destroying crickets.

Mormon cricket damage studied.--A field study of the damage caused by Mormon crickets to cultivated and range plants was carried on during the crop season of 1938 by Ralph B. Swain, general supervisor, and "scattered" observations were made by cooperating supervisors of the infested States. Mr. Swain's observations were confined to areas in Nevada, Idaho, and Oregon. An attempt was made to determine the exact nature of the injury done to cultivated and range plants by estimating or measuring the loss in volume of the vegetative and reproductive parts. A list of all plants on which Mormon crickets were found feeding was compiled. Twenty-seven permanent plots of 0.1-acre each were established in cricket-infested areas, and representative plant species were individually staked and periodically examined for cricket injury. A method of measuring Mormon cricket injury to range, in terms of percentage loss in carrying capacity, was devised. Some of the

conclusions are: (1) The Mormon cricket is a general feeder. (2) There is a definite preference for certain food plants. In general, the more succulent the plant the more attractive it is. (3) There is a definite preference for particular parts of a food plant. The reproductive parts receive the greatest injury. (4) Injury is confined to actual eating of plant parts or to the killing of the foliage and flowers of certain shrubs by the girdling of the current year's twigs. (5) Feeding is never entirely stopped during migration. (6) Feeding is inhibited during certain hours of the day by mating or egg-laying activities. (7) Feeding slackens during the later stages of adult life when cannibalism becomes more frequent. (8) The nature of feeding is such that modifications of range-management methods may be used to measure Mormon cricket damage. In the present instance damage in terms of percentage loss in range-carrying capacity has been estimated. (9) On the basis of percentage-loss estimates in 0.1-acre plots, it is seen that Mormon cricket injury may range from slight to total destruction of carrying capacity for a single season. (10) By using large-scale sampling methods of the point-observation-plot type, together with estimates of carrying-capacity loss, it may be possible to determine accurately the degree of Mormon cricket injury to large areas of range land.

Progress in peach mosaic control.--The peach mosaic disease is now known to occur in 59 counties in 7 States. As a result of 1938 inspections, the disease was found in 1 county in Colorado, 4 counties in Texas, and 3 in Utah, not heretofore known to be infected. There was a decided reduction in 1938 in the incidence of the disease in California, New Mexico, Utah, and the El Paso Valley of Texas, according to the field project leader, A. E. Cavanagh. Furthermore, there were nearly 42,000 less infected trees in the entire mosaic area this year than in 1937--a 56-percent decrease. In 6 previously infected counties in 3 States no mosaic was found in 1938, and in 2 counties in 1 State, no mosaic has been found for 2 years. Very satisfactory results have been obtained in economic control of the mosaic disease in Colorado. Progress is being made in Arizona in the removal of diseased trees found in 1936 and 1937. Grower cooperation throughout the infected areas has improved because of the educational program carried on through county agents, 4-H Clubs, high-school agricultural classes, and other civic clubs. Emergency funds allotted to the Bureau have made possible the removal of diseased trees at the time of inspection and the eradication of millions of abandoned and escaped peach trees from the environs of nurseries and commercial orchards.

Lifting of phony peach quarantines from certain areas under consideration.--In accordance with the provisions of the standard State quarantines on account of the phony peach disease, it will be in order to release from regulation the States of Maryland and Oklahoma, as well as 5 counties in 3 other lightly infected States. No infections were found in the inspections this past season of 167 previously infected counties in 16 States. The outstanding accomplishments on this work may be attributed to a great extent to uniform action of the various States in revoking the ineffective quarantines issued prior to 1937 which were based on the practice of culling for the peach borer, formerly suspected of being the vector of the phony peach disease, and enacting in their state regulations which require, as a basis of certification for shipment, the inspection of nursery environs and the removal of diseased trees therein by a specified date.

Federal quarantine action on account of white-fringed beetle.--Effective January 15, 1939, the Secretary of Agriculture issued a Federal quarantine (No. 72) on account of the white-fringed beetle infestations in 20 counties and parishes in Alabama, Florida, Louisiana, and Mississippi. The interstate movement of such materials as soil, compost, manure, and balled nursery stock, as well as potatoes and sweetpotatoes, is regulated throughout the year, whereas bare-rooted nursery stock and other plants, beans, peas, peanuts in shells, cotton, hay and other roughage, lumber and other unmanufactured wood, building materials, used machinery, junk, and similar articles are restricted during part of the year. "The larvae of the beetle feed on a wide variety of plant roots and tubers, while the adults feed on leaves and tender shoots close to the ground," Lee A. Strong stated, in referring to the quarantine action. "Adults may be carried to other points by any moving thing, eggs may be transported from place to place in the movement of almost any article coming in contact with the ground, and larvae may be moved with various kinds of soil, peat, compost, and manure. It is evident, therefore, that the cosmopolitan food habits of the pest, its diverse means of spread in any stage of development, together with its parthenogenetic mode of reproduction, characterize the white-fringed beetle as a potentially serious threat to American agricultural and horticultural interests."

White-fringed beetle adults found in December.--Thirteen live Nau-pactus leucoloma adults were found in December near Lake Ponchartrain, New Orleans, La., in well-protected spots somewhat warmer than other parts of the city. Three live beetles of Naupactus, new species, were found in Gulfport, Miss., as late as December 31, and were easily found at that point until December 15.

White-fringed beetle control activities.--Larval inspections for white-fringed beetle infestations were made in December at several infested points, including nursery areas in New Orleans and Baton Rouge. An increased number of larvae were found in New Orleans. In December 111 tons of sterilized soil was distributed to nurserymen by the Louisiana State Department of Agriculture. Nurserymen and florists of the New Orleans area are repotting plants in sterilized soil and cleaning up infested premises. The 13 inspectors assigned to that area in December made an effort to maintain 24-hour service for the inspection of holiday shipments by nurserymen and florists. Another regulatory district was established to include most of the produce shippers in the city. Over 14,000 permits were issued for the movement of nursery stock and other articles in the New Orleans area during the month. In the Florala, Ala., and Laurel and Gulfport, Miss., areas woodlands are being cleared of underbrush and on the more open localities and railroad rights-of-way vegetation is burned off in preparation for 1939 control activities.

Sweetpotato weevil control activities.--December 15 was set as the deadline date for cleaning up the sweetpotato fields in the weevil-infested counties of Alabama, Georgia, Mississippi, and Texas, in accordance with the provisions of the standard State quarantines, and this standard was reached in practically all instances. In Georgia, Mississippi, and Texas 223 fields have been replowed since harvest. Clean-up work and the eradication of wild host plants is also going forward in Alabama, with the assistance

of State-sponsored W. P. A. crews. The unusually heavy movement of sweet-potatoes during December necessitated increased activity in quarantine inspection and certification.

Inspection at the Christmas-shipping season.--The assistance of four inspectors from the Japanese beetle force, temporarily assigned to transit inspection in New York for the holiday shipping, made it possible to cover almost completely all incoming trains from New England points, as well as freight terminals, and to check the deliveries of nursery stock at the World's Fair grounds. Wholesale flower markets in New York City, where last year willful violations were found on the part of truckers bringing Christmas greens from New England, showed this season that the presence of an inspector had brought about greatly improved conditions as to quarantine compliance. Only 1 truck violation was found. Approximately 170 railway shipments moving in violation of quarantine regulations were intercepted at New York in December. Fifty-seven shipments containing Christmas gifts accompanied by evergreen twigs were inspected, certified, and allowed to proceed. The volume of mail handled at New York reached a new high, said to be the largest in the history of the Pennsylvania terminal, with an increase of 14½ percent in storage-car-footage over 1937. Boston inspectors were assisted by 2 temporarily assigned inspectors from the Japanese beetle force, and 225 violations were reported from that station in December. Christmas trees, wreaths, and woody cuttings made up 65 percent of the violations at Boston and evergreen cones 17 percent. Mail shipments at Boston increased 500 percent over last year and express shipments 390 percent. The Pittsburgh inspector reported the inspection of 74 carload lots of Christmas trees originating principally in New England and Canada. Other decorative materials seen at that station were shipped principally from Delaware, Maryland, New Jersey, Pennsylvania, and North Carolina. Pine cones affixed to artificial wreaths originating with wholesale concerns in the gypsy moth area were found moving as violations at various stations.

"Hats - Don't Crush."--So read the label and waybill on a box of uncertified holly cuttings caught by the watchful eye of a Boston inspector.

Fewer Christmas trees shipped from New England.--The marked decline of New England trees in the Christmas-tree trade this past season was the subject of comment by transit inspectors at various points in the Midwest, Northeast, and South. The chief sources of Christmas trees passing through those inspection points were the Lake States, the Far West, and South.

Citrus canker eradication activities.--During December inspection for citrus canker was made cooperatively with the State on 447 properties in 4 Texas counties. Over 100,000 abandoned citrus trees were destroyed. Eighteen inspectors and 300 laborers, the latter on emergency relief rolls, were employed. No canker was found during the month. In the calendar year 1938 but 1 new case of citrus canker was found in Texas. There were 5 recurrent cases.

CONTROL INVESTIGATIONS

Rise of glycogen in the southern armyworm after glucose ingestion.--Using the sandwich method, F. H. Babers, in the Beltsville, Md., laboratory fed glucose to mature sixth-instar larvae of the southern armyworm (Prodenia eridania Cram.). At varying time intervals the hemolymph and tissues were analyzed for glycogen content. After feeding approximately 12 mg of glucose, the tissue of glycogen began to rise within 30 minutes and rose to a peak in 7 hours at which time, as reported in an earlier news item, the blood glucose was back to normal. The tissue of glycogen then fell off sharply but remained considerably above normal for at least 24 hours, after which time no further analyses were made. No consistent rise in blood glycogen was obtained after feeding of only one sandwich but after much longer feeding on glucose, the blood glycogen rose to five-seven times its normal value. Most of the blood glycogen is concentrated in the cells and it is thought that perhaps the small amount found in the plasma may have been due to cell rupture during centrifugation.

Pentaerythrityl bromide patented.--William G. Rose and Herbert L. J. Haller (U. S. Patent 2,140,481) have patented, as an insecticide, pentaerythrityl bromide. In laboratory tests this was toxic to the cross-striped cabbage worm, the southern armyworm, the cabbage looper, and codling moth larvae.

Study of sodium arsenite begun.--Dusting with a mixture of one part by weight of powdered sodium arsenite and three parts by weight of diatomaceous earth is the standard measure employed by the Division of Domestic Plant Quarantines for control of the Mormon cricket in our Mountain States. The materials as now used are not entirely satisfactory and the Division of Insecticide Investigations has been called upon to take part in a study, in cooperation with the Division above mentioned and the Division of Cereal and Forage Insect Investigations, of the possibility of improving the mixture. The chemical nature of sodium arsenite will be studied in an effort to establish reasonable specifications for it; the particle-size distribution will also be studied with the idea of developing physical specifications defining a product most suitable as regards its behavior in the dust gun and its carry when blown out; and various easily obtainable diluents will be examined physically in an effort to determine the one best suited to the type of sodium arsenite finally selected.

New method of examining powdered insecticidal materials and diluents used with them.--As noted in previous issues of the News Letter, the Division is actively engaged in the study of the physical characteristics of dusting and spraying materials, of which it regards the state of subdivision as being perhaps the most important. Complete analyses of particle-size distribution have been made on some of the more important insecticidal materials, but the sedimentation method used, even with the improved apparatus developed in the Division, is time-consuming and not universally applicable. Recently there has come to our notice a method of estimating the specific surface of powders, by which is meant the total surface area of all the particles in a unit volume of substance. It is obvious that the specific surface is a function of the particle size and, although it has but a single value for any sample and hence cannot be equivalent to an analysis of the particle-size

distribution, yet we feel it may constitute a diagnostic characteristic upon which some idea may be formed of the suitability of insecticidal dusts and diluents. The method consists merely of measuring the drop in pressure when a current of air of known velocity is forced through a column of the compacted powder of known length, diameter, and weight. The aerodynamic formulas for reducing these observations to specific surface are known. A suitable apparatus has been constructed in the Division and is now in operation, and its operation has been found to be simplicity itself. So far only one sample has been examined, namely, the finest fraction of a particular calcium arsenite; the area found is more than that which we can calculate from the particle-size-distribution curve previously determined by sedimentation, which is as it should be because the latter contains no information concerning the 28 percent by weight of finest material in the sample. It is planned to use the method for the examination of all the common insecticides and powdered diluents.

BEE CULTURE

Package bee production per colony can be stepped up.--Warren Whitcomb, Jr., of the laboratory at Baton Rouge, La., writes: "During the spring of 1937 an experiment was started to determine the best methods of producing package bees. The results of a single season's work indicated that production could be increased enormously by regular heavy shakings and by supplying abundant honey and pollen at all times. It was felt, however, that even heavier shakings plus stimulatory feeding might produce still better results, and during the 1938 season such an experiment was started." In summarizing the results of this work for the past season, Mr. Whitcomb states: "In general, it was again demonstrated that 30 pounds, rather than the 10-12 pounds obtained by commercial operators of bees, can be obtained from normal colonies by proper management. The maximum yield has probably not yet been reached and indications are that proper stimulatory feeding plus abundant pollen stores early in the season may increase the yield considerably."

Survey shows Wisconsin beekeepers losing honey through weak colonies.--C. L. Farrar, Madison, Wis., in analyzing data obtained from 17 Wisconsin beekeepers who possessed a total of 3,438 colonies, reports as follows: "The average crop for these beekeepers was 125 pounds and their crops ranged from 30 to 300 pounds per colony. Their maximum yielding colonies averaged 378 and ranged from 175 to 600 pounds. These records show that commercial beekeepers are obtaining average crops which equal only one-third of these maximum yields, indicating that they are failing to harvest the major part of their potential crop because their colonies are not in condition for the honey flow."